SIGNIFICANCE

How do I perform a two-sample z test for proportions?

1988–1994

$n_2 = 3000$

$\hat{p}_2 = 0.15$

2005–06

$n_1 = 1800$

$\hat{p}_1 = 0.195$

Parameter of interest is the difference in proportions of teens with hearing loss from 05-06 to 88-94.

Perform a two-sample z-test for proportion $p_1 - p_2$ where p_1 is the proportion of teens with hearing loss during 05-06 and p_2 is the proportion of teens w/ hearing loss during 1988-94.

Check conditions:

Random ✓

Normal:

$n_1\hat{p}_1 = 1800(.195) = 351 \geq 10$

$n_1(1-\hat{p}_1) = 1800(.805) = 1449 \geq 10$

$n_2\hat{p}_2 = 450 \geq 10$ $\quad n_2(1-\hat{p}_2) = 2550 \geq 10$

Independence: Because there are more than 30,000 teenagers and because the samples were taken during two different time periods, the independence condition has been met.

All conditions have been met to perform a two-sample z-test.

$H_0: p_1 = p_2$

$H_a: p_1 > p_2$ OR $p_1 - p_2 > 0$

Use $\alpha = 0.05$ significance level.

$\hat{p}_c \rightarrow$ pooled/combined prop.

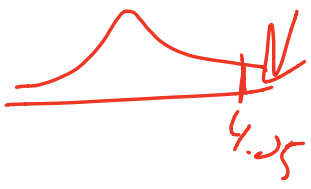
$$\hat{p}_c = \frac{450+351}{3000+1800} = 0.167$$

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_c(1-\hat{p}_c)\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$

$$z = \frac{0.195 - 0.15}{\sqrt{0.167(1-.167)\left(\frac{1}{1800}+\frac{1}{3000}\right)}}$$

$z = 4.05$

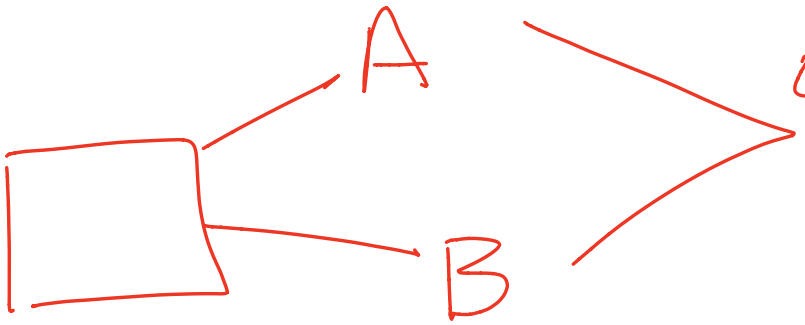
p-value from table

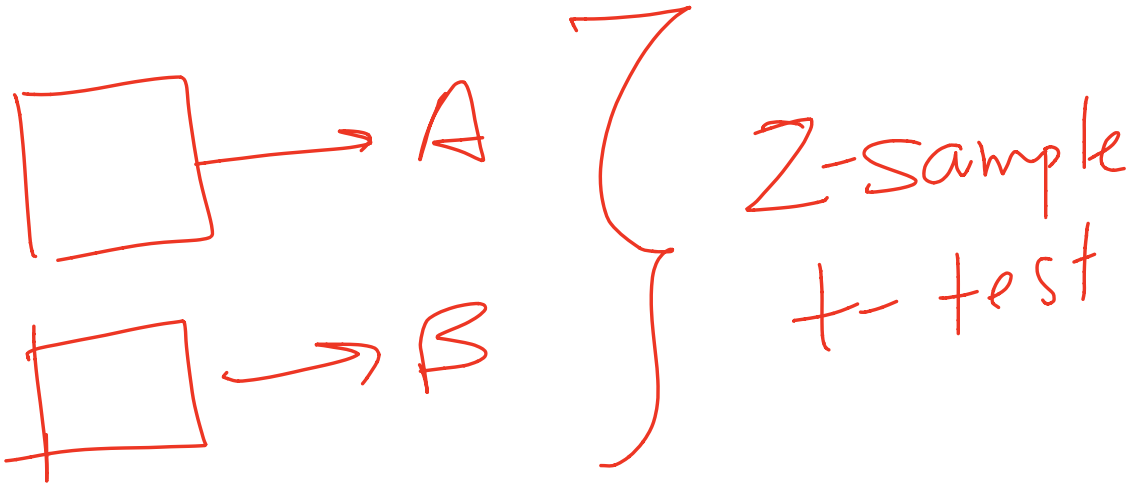


p-value ≈ 0

Since $0 < 0.05$, we reject H_0.
We have convincing evidence that the proportion of all teens with hearing loss has increased from 1988-94 to 2005-06.

10.2 Comparing Two Means





The proper method of analysis depends on <u>design of study.</u>

p .637
deg of freedom

2 samp t test → Automatically calc. df

HW - 10.2 FINISH

#16 on p. 623 turn in